

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of : )  
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Perino et al. )  
 )  
Application No.: Not yet assigned )  
 )  
Filed: Herewith )  
 )  
For: Re-Issue of U.S. Patent No. 5,908,333 )  
issued June 1, 1999 and entitled )  
 )  
CONNECTOR WITH INTEGRAL )  
TRANSMISSION LINE BUS )  
 )  
\_\_\_\_\_ )

Assistant Commissioner for Patents  
Washington, D.C. 20231

AMENDMENT UNDER 37 C.F.R. § 1.173(b)

Sir:

Prior to examination, please amend the above-identified reissue application as follows:

IN THE CLAIMS:

Please amend claim 1 and add new claims 18-63 as follows:

- 1 1. (Amended) An electrical connector comprising a plurality of bus conductors each
- 2 running through the length of the connector yet being electrically isolated from one
- 3 another and each having a number of compliant contact regions disposed at various
- 4 positions along their respective lengths so as to provide electrical coupling points
- 5 for like contact regions of electrical devices to be received within the connector, the
- 6 bus conductors being divided into first and second groups such that across the width

of the connector [a] each bus conductor of the first group is positioned adjacent to at  
least one of the bus conductors of the second group [that is positioned adjacent to  
yet another bus conductor of the first group, and so on for each of the plurality of  
bus conductors], the transmission line impedance of any pair of adjacent bus  
conductors, one being chosen from the first group and the other being chosen from  
the second group, being determinable, wherein each of the bus conductors of the  
first group are adapted to be electrically coupled to respective signal paths  
associated with a circuit board on which the connector is to be mounted through  
only two electrical contact elements regardless of the number of compliant contact  
regions, the two electrical contact elements of each bus conductor of the first group  
being arranged so that each is disposed substantially near an end of its respective  
bus conductor, and the bus conductors of the second group each being adapted to be  
electrically coupled to an electrical ground plane associated with the circuit board  
through a number of electrical contact elements disposed along their respective  
lengths, the number of electrical contact elements being irrespective of the number  
of compliant contact regions.

18. A socket for providing an electrical interface between a substrate and a plurality of  
removable electronic components, the socket comprising:  
a socket housing adapted to receive the plurality of removable electronic  
components; and  
a first signal conductor extending through the socket housing and having a  
predetermined impedance and first and second ends adapted to couple  
respectively to first and second traces disposed on the substrate such that the  
first signal conductor forms a signal transmission line between the first and  
second traces, the first signal conductor further having a plurality of electrical

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10           contact regions to couple to counterpart electrical contact regions disposed on  
11           the plurality of removable electronic components.

1   19.   The socket of claim 18 further comprising additional signal conductors extending  
2           through the socket housing parallel to the first signal conductor, the additional  
3           signal conductors each having the predetermined impedance and first and second  
4           ends adapted to couple to a respective additional pair of traces on the substrate such  
5           that each additional signal conductor forms a signal transmission line between the  
6           additional pair of traces, each additional signal conductor further having a plurality  
7           of electrical contact regions to couple to additional counterpart electrical contact  
8           regions disposed on the plurality of removable electronic components, the first  
9           signal conductor and the additional signal conductors forming a signaling bus that  
10           extends through the socket housing.

1   20.   The socket of claim 18 further comprising a first ground conductor extending  
2           through the socket housing and disposed adjacent the first signal conductor, the first  
3           ground conductor having a plurality of contact elements disposed along its length to  
4           couple the first ground conductor to a ground plane of the substrate.

1   21.   The socket of claim 20 further comprising:  
2           additional signal conductors extending through the socket housing in a direction  
3           parallel to the first signal conductor, the additional signal conductors each  
4           having the predetermined impedance and first and second ends adapted to  
5           couple to a respective additional pair of traces on the substrate such that each  
6           additional signal conductor forms a signal transmission line between the  
7           respective additional pair of distinct traces, each additional signal conductor  
8           further having a plurality of electrical contact regions to couple respectively to

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9 additional counterpart electrical contact regions disposed on the plurality of  
10 removable electronic components, the first signal conductor and the additional  
11 signal conductors forming a signaling bus that extends through the socket  
12 housing;

13 additional ground conductors extending through the socket housing parallel to the  
14 first ground conductor, each of the additional ground conductors having a  
15 plurality of contact elements located along its length to couple to a ground  
16 plane of the substrate; and

17 wherein signal conductors, including the first signal conductor and the additional  
18 signal conductors, and ground conductors, including the first ground  
19 conductor and the additional ground conductor, are disposed within the socket  
20 housing such that each of the signal conductors is adjacent a respective one of  
21 the ground conductors.

1 22. The socket of claim 21 wherein each one of the signal conductors is disposed  
2 adjacent another one of the signal conductors.

1 23. The socket of claim 21 wherein the signal conductors and the ground conductors are  
2 disposed within the socket housing such that each of signal conductor of a subset of  
3 the signal conductors is positioned between a respective pair of the ground  
4 conductors.

1 24. The socket of claim 21 wherein the signal conductors and ground conductors are  
2 disposed within the socket housing such that the contact regions of each signal  
3 conductor oppose the contact regions of the adjacent ground conductor.





1 36. The socket of claim 35 wherein the termination impedance on the substrate is a  
2 resistor coupled to the second trace.

1 37. The socket of claim 18 wherein each of the removable electronic components is a  
2 daughter card and the socket housing is adapted to receive a plurality of the  
3 daughter cards.

1 38. The socket of claim 18 wherein each of the removable electronic components is an  
2 integrated circuit device and the socket housing is adapted to receive a plurality of  
3 the integrated circuit devices.

1 39. The socket of claim 18 wherein the first and second ends of the first signal  
2 conductor include posts adapted to fit into respective holes in the substrate.

1 40. An electrical connector comprising:  
2 a connector housing having a plurality of slots to receive removable electronic  
3 components;  
4 a plurality of signal conductors that extend through the connector housing to form a  
5 signaling bus, the signal conductors including contact regions to electrically  
6 couple the removable electronic components to the signaling bus, each of the  
7 signal conductors having first and second ends to couple to respective signal  
8 traces on a substrate and having a predetermined impedance; and  
9 a plurality of ground conductors that extend through the connector housing parallel  
10 to the signal conductors, the ground conductors each including a plurality of  
11 contact regions to electrically couple to a ground reference of the substrate,  
12 the ground conductors and signal conductors being disposed within the

13 connector housing such that each of the signal conductors is adjacent at least  
 14 one of the ground conductors.

1 41. The electrical connector of claim 40 wherein the predetermined impedance is  
 2 selected to match a termination impedance of the signaling bus.

1 42. The electrical connector of claim 41 wherein the termination impedance is formed  
 2 by a plurality of resistors coupled respectively to the signal traces on the substrate.

1 43. The electrical connector of claim 40 wherein a dielectric spacer is positioned  
 2 between each signaling conductor and adjacent ground conductor.

1 44. The electrical connector of claim 40 wherein each of the signal conductors forms a  
 2 transmission line between the respective signal traces when coupled thereto.

1 45. The electrical connector of claim 40 wherein each of the signal conductors is  
 2 adapted to be coupled to the substrate only at the first and second ends, and wherein  
 3 each of the ground conductors includes at least three contact regions to couple to the  
 4 ground reference of the substrate.

1 46. The electrical connector of claim 40 wherein the contact regions of the signal  
 2 conductors and the contact regions of the ground conductors each extend into the  
 3 slots of the connector housing to contact counterpart contact regions of the  
 4 removable electronic components when the removable electronic components are  
 5 inserted into the slots of the connector housing.

1 47. A signaling system comprising:



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2 a substrate including a first plurality of signal conducting traces and a second  
3 plurality of signal conducting traces;  
4 a socket mounted to the substrate and including a housing with slots formed therein,  
5 the socket further including a plurality of signal conductors that extend  
6 through the housing in a direction transverse to the slots, each signal  
7 conductor of the plurality of signal conductors having a predetermined  
8 impedance and being coupled to form a transmission line between a respective  
9 one of the first plurality of signal conducting traces on the substrate and a  
10 respective one of the second plurality of signal conducting traces on the  
11 substrate; and  
12 a plurality of electronic components removably inserted into the slots of the socket  
13 housing, each of the electronic components including a plurality of contact  
14 regions that respectively contact the plurality of signal conductors.

1 48. The signaling system of claim 47 wherein each of the plurality of electronic  
2 components comprises a printed circuit board having an integrated circuit device  
3 mounted thereon.

1 49. The signaling system of claim 48 wherein the integrated circuit device is a  
2 semiconductor memory device.

1 50. The signaling system of claim 49 wherein the semiconductor memory device is a  
2 dynamic random access memory device.

1 51. The signaling system of claim 49 further comprising a memory controller mounted  
2 to the substrate and coupled to the first plurality of signal conducting traces, the

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3 memory controller being adapted to transmit signals to the semiconductor memory  
4 device via the first plurality of signal conducting traces.

1 52. The signaling system of claim 47 wherein each of the electronic components  
2 comprises an integrated circuit device.

1 53. The signaling system of claim 52 wherein the integrated circuit device is a  
2 semiconductor memory device.

1 54. The signaling system of claim 53 wherein the semiconductor memory device is a  
2 dynamic random access memory device.

1 55. The signaling system of claim 53 further comprising a memory controller mounted  
2 to the substrate and coupled to the first plurality of signal conducting traces, the  
3 memory controller being adapted to transmit signals to the semiconductor memory  
4 device via the first plurality of signal conducting traces.

1 56. The signaling system of claim 47 further comprising a plurality of termination  
2 elements coupled respectively to the second plurality of signal conducting traces.

1 57. The signaling system of claim 56 wherein the predetermined impedance of each  
2 signal conductor of the plurality of signal conductors is selected to match the  
3 impedance of a respective one of the termination elements.

1 58. The signaling system of claim 47 wherein the socket further includes a plurality of  
2 ground conductors that extend through the housing in a direction transverse to the  
3 slots in the housing, each of the plurality of ground conductors including a plurality  
4 of contact regions to contact the plurality of electronic components.

1 59. The signaling system of claim 58 wherein each of the plurality of ground conductors  
2 is disposed within the housing adjacent at least one of the plurality of signal  
3 conductors, the plurality of ground conductors and signal conductors forming a  
4 plurality of signal-ground conductor pairs.

1 60. The signaling system of claim 59 wherein each of the signal-ground conductor pairs  
2 contacts a first electrical component of the plurality of electrical components on  
3 opposing faces of the first electrical component.

1 61. The signaling system of claim 60 wherein each of the signal-ground conductor pairs  
2 are disposed within the socket housing such that the plurality of signal conductors  
3 alternately contact a first face and a second face of the opposing faces of the first  
4 component.

1 62. The signaling system of claim 61 wherein each of the signal-ground conductor pairs  
2 are disposed within the socket housing such that the plurality of ground conductors  
3 alternately contact the first face and the second face of the opposing faces of the  
4 first component.

### REMARKS

Applicant respectfully requests that this amendment be entered prior to examination of the above-identified reissue application.

Applicant has amended claim 1 to correct an error believed to render claim 1 unduly narrow. Applicant has also added new claims 18-62 to more completely claim the invention disclosed in the original patent.

The amended claim and new claims are fully supported by the original patent and do not add new matter. Examples of support for new claims 18-62 may be found as follows:

- Claim 18: column 4, line 45 - column 5, line 6; column 5, line 41 - column 6, line 31; figures 2 and 3A;
- Claim 19: column 6, line 66 - column 7, line 1; column 4, line 59 - column 5 line 12; figure 4;
- Claim 20: column 6, lines 31-65; figure 3B;
- Claim 21: column 7, lines 15-26; column 8, lines 18-24; figures 5 and 10;
- Claim 22: column 7, lines 15-26; figure 5;
- Claim 23: column 8, lines 18-24; figure 10;
- Claim 24: column 8, lines 34-46; figures 10 and 11;
- Claim 25: column 8, lines 34-46; figures 10 and 11;
- Claim 26: column 8, lines 34-46; figures 10 and 11;
- Claim 27: column 8, lines 34-46; figures 10 and 11;
- Claim 28: column 7, lines 4-7; figure 4;
- Claim 29: column 7, lines 1-7;
- Claim 30: column 7, lines 8-10;
- Claim 31: column 5, lines 42-51; column 6, lines 17-47; figures 3A, 3B and 4;
- Claim 32: column 5, lines 52-67; figures 3A and 4;

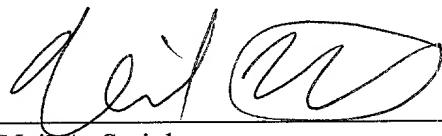
- Claim 33: column 5, lines 64-67; column 7, lines 10-12; figure 4
- Claim 34: column 5, lines 64-67;
- Claim 35: column 5, lines 13-32; column 6, line 66 - column 7, line 26;
- Claim 36: column 5, lines 13-32;
- Claim 37: column 4, lines 10-65; figure 2;
- Claim 38: column 4, lines 10-65; figure 2;
- Claim 39: column 5, lines 9-10; figure 3A;
- Claim 40: column 4, line 45 - column 5, line 6; column 5, line 41 - column 6, line 65; column 7, lines 15-26; column 8, lines 18-24; figures 2, 3A, 3B, 5 and 10;
- Claim 41: column 5, lines 13-32; column 6, line 66 - column 7, line 26;
- Claim 42: column 5, lines 13-32;
- Claim 43: column 7, lines 4-7; figure 4;
- Claim 44: column 5, lines 7-32;
- Claim 45: column 6, lines 17-47; figures 3A and 3B;
- Claim 46: column 8, lines 33-61; figure 11;
- Claim 47: column 4, line 45 - column 5, line 6; column 5, line 41 - column 6, line 65; column 7, lines 15-26; column 8, lines 18-24; figures 2, 3A, 3B, 5 and 10;
- Claim 48: column 4, lines 10-65; figure 2;
- Claim 49: column 4, lines 10-65; figure 2;
- Claim 50: column 4, lines 10-65; figure 2;
- Claim 51: column 4, lines 48-65; column 5, lines 42-51; figure 2;
- Claim 52: column 4, lines 10-65; figure 2;
- Claim 53: column 4, lines 10-65; figure 2;
- Claim 54: column 4, lines 10-65; figure 2;
- Claim 55: column 4, lines 48-65; column 5, lines 42-51; figure 2;

Claim 56: column 5, lines 13-32;  
Claim 57: column 5, lines 13-32; column 6, line 66 - column 7, line 26;  
Claim 58: column 6, lines 31-65; figure 3B;  
Claim 59: column 7, lines 15-26; column 8, lines 18-24; figures 5 and 10;  
Claim 60: column 8, lines 34-46; figures 10 and 11;  
Claim 61: column 8, lines 34-46; figures 10 and 11; and  
Claim 62: column 8, lines 34-46; figures 10 and 11.

The undersigned attorney respectfully requests a telephone call from the Examiner before issuance of a first office action, to help resolve issues and expedite handling of this application.

Respectfully submitted,

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